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FARM RESEARCH

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SPRUCE GALL APHIDS IN NURSERY AND ORNAMENTAL PLANTINGS

Two Species Produce Unsightly Growths On Several Types Of Evergreens—Timely and Thoro Spraying Gives Effective Control

by F. L. GAMBRELL

THE nursery industry in New York includes some 12,000 acres which are devoted to the propagation of various types of plants that are to be used for commercial and ornamental purposes. Not only do spruces constitute a large percentage of the evergreens commonly grown in many nurseries, but they are also used extensively in ornamental and reforestation plantings. Like most other plants, however, spruces are not immune to insect attack.

The spruce gall aphids are perhaps the most common insects which attack spruce trees in both nursery and ornamental plantings. There are at least two species of aphids involved. These are known as the spruce gall aphid and the Sitka gall aphid. The first of these attacks principally Norway and white spruces but may also be found to some extent on other species of spruce. This particular aphid is an important pest in both the nursery and home planting.

The Sitka gall aphid occurs largely on Colorado blue spruce on which it causes very definite injury. It is also present on Douglas fir during part of its life cycle, hence more than one type of evergreen is involved. This aphid is more commonly found on trees in the home planting, but has recently proved to be a pest in some commercial nurseries as well.

The injury caused by these two aphids, while of the same general type, is quite different in appearance, as indicated in Fig. 1. It consists in either case of a swelling or enlargement of the new needles and is characterized by the presence of unsightly galls or enlargements on the growing twigs. These swellings are a direct result of the aphids feeding upon the new growth. The galls or enlargements caused by the spruce gall aphid are located at the bases of the twigs, and usually the new growth extends beyond the swelling. Those caused by the Sitka gall aphid are long, more or less cylindrical in shape, and usually affect the entire new growth of the shoot on which they occur.

Fig. 1.—Injury by spruce gall aphid on Norway spruce (left); and by Sitka gall aphid on Colorado blue spruce (right).

NEW VARIETIES

IN looking thru the new nursery catalogs, beautiful pictures and florid descriptions of fruits are occasionally noted. If one might believe all one saw and read, it would be advisable to make a substantial investment in many of these new kinds. True, the occasional plunger sometimes comes out on top, but it is likewise true that he is more often the loser. Your Experiment Station has been and is testing new varieties of fruit as they appear. Usually there are about 2,000 old and new varieties under observation on the Station grounds. Before making too heavy an investment, therefore, you would do well to find out what is known about any new varieties you contemplate buying.

Timing Control Measures

THE success of control measures against the spruce gall aphids depends very largely upon choosing the stage in their life histories which is

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VITAMINS FOR CALVES

by A. C. DAHLBERG and L. A. MAYNARD

IS it necessary to give vitamins A and D to well-fed dairy calves? It has been clearly demonstrated by several investigators that vitamins A and D are necessary for the proper growth and development of dairy calves and that under certain feeding conditions calves suffer for want of these vitamins. An unthrifty condition of calves from 3 to 10 months of age is not uncommon on dairy farms and has often been observed in the Experiment Station herd at Geneva.

In a feeding experiment reported in the January *Journal of Dairy Science* all of the calves were fed whole milk for 2 days, then pasteurized milk with added skimmilk to give a test of 2½ per cent milk fat for 2 months, then skimmilk until 6 months old. Water was given once daily after 2 months of age and twice daily after 6 months. A good quality of alfalfa hay was before the calves at all times. Grain was fed according to the age and breed of the calves. One lot of calves received a vitamin A and D concentrate in cod-liver oil, but the other lot received no extra vitamins above those secured in the hay, grain, and milk. The calves were weighed weekly for 40 weeks.

It was concluded from the experiment that, "When calves were fed rather liberal quantities of partially skimmed milk, skimmilk, all the good alfalfa hay they could consume, and a good grain ration, the feeding of vitamin A and D concentrate with cod-liver oil did not increase growth during a 40-week feeding trial. If there was any difference in general health, it was in favor of the calves fed vitamin A and D supplement, but such differences, if present, were slight.

"The experiment indicated the necessity of good hay being available to the calves at all times to secure maximum growth and a thrifty condition of health even though skimmilk and grain were fed in liberal quantities."

These conclusions agree with the statement of Professor F. B. Morrison in the 20th edition (1936) of his *Feeds*

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MUCH SEED RESEARCH MAY BE DONE ON THE FARM

In Fact That Is The Only Place Where Many Of The Answers Can Be Found To The Questions Involved In Development Of Good Seed Stocks

by M. T. MUNN

THERE is a type of farm research which can be carried on to better advantage right on the farm than at any other place and that is an investigation into the actual quality of the seed stock used on the farm. In fact, in many cases, that is the only place where important final decisions regarding the seeds to be used can be made. Having decided to plant a definite acreage to certain crops, the farmer then must seek a source of seed. He may get it from his own granary, from that of a neighbor, or from a seed dealer, seedhouse, or similar source.

In any case what he gets will depend upon what has gone into that seed stock in the form of breeding and selection which carry intrinsic values, and also, upon the impurities which may be present in the form of weed seeds and fungous spores both of which may foul the land and the final crop. Any one of these three factors alone may be sufficient, under certain circumstances, to spell failure for the crop or at least to take all of the profit out of the operation.

One problem which is becoming increasingly important and which is causing more and more concern is the encroachment of the land-fouling weeds upon the better tillable lands of the State. Much of this increase in weediness of farm lands is due to the continued use of uncleaned seeds. Perhaps there is no place where a better appraisal of this situation can be had than right here in the seed testing laboratory where workers daily handle samples of seeds to be used for planting. These samples come from all sources. Most of the samples from professional seedsmen represent stocks which are cleaned just as thorolly as possible with large intricate mills employing every conceivable device.

Sources Of Uncleaned Seed

QUITE a different condition exists, however, in the case of seed stocks, particularly uncleaned or partially cleaned clover and fine grass seeds, which farmers are selling directly to each other. To a certain extent the same condition exists in low-priced mail-order seed.

The State seed law requires that every lot of clover and grass seed sold directly for seeding purposes must be labeled or tagged to show its purity, including the percentage of weed seeds present, and its germination. This requirement brings into the laboratory for the proper tests many samples from lots of seed which farmers have to sell.

Much of this seed is sold to neighboring farmers who come to the farm and get the seed. A few lots of seed from clean fields are about as clean as they can be. The regrettable part of it all is that much of the seed thus sold is not adequately cleaned as analysis so well shows. Some of it is but little better than thresher-run stock. Occasionally lots have been cleaned with a small seed cleaner which at its best can remove only certain easily removed impurities. There are some lots of seed which are fouled with certain weeds of the same size and weight as the crop seed and which cannot be removed even with the best mill available.

Clover Seed Finds Ready Sale

BECAUSE of the high prices of seed this year, all clover and grass seed find a ready market. Every farmer who has any excess clover seed finds a fairly ready sale regardless of its condition. Often the only question asked is the price. Since the inexperienced eye finds it difficult to detect the weed seeds in these small seeds, that condition is nearly always overlooked. Then too, the seller frequently assures the buyer that the seed has been tested and a laboratory report is displayed as evidence of that fact. Yet both buyer and seller forget that testing a lot of seed adds nothing to its quality, but only attempts to reveal what it really is in terms of possible planting value.

Far too many buyers of these imperfectly cleaned lots of seed pay little attention to the kind and amount of weed seeds present so long as the price is right, reasoning, often in spoken words, that they have weeds anyway and a few more will make no difference, forgetting all the time that if they plant that seed they are scattering evenly all over the field these many viable weed seeds (often several per square yard) where they will have ideal conditions to grow in keen competition with the crops desired and may be expected to appear for years to come.

In certain cases tests have shown very definitely that where weedy clover seed was originally used, the seed crops coming from those fields became increasingly foul with weed seeds year after year.

Past Season Produced Weedy Seeds

EARLY last summer when it was seen that the dry weather was affecting seed crops nationwide publicity brought this fact to the attention of many farmers who cut for seed purposes meadows which, because of their weedy condition, should not have been cut for seed at all but instead should have been cut earlier to prevent seed production. Scores of samples from such fields have been tested and show percentages of impurity ranging anywhere from 2 to 8 per cent and even as high as 30 per cent by weight of weed seeds.

Those who sent in the samples with the high weed seed content, as well as those who submitted the samples of lower weed seed content, paid the required laboratory fees for the service and, so far as we know, the seed went into the trade channels thru the farm-to-farm method. Such practices are bound to have their after effects. Indeed during the past two seasons there is ample evidence of such after effects thru the increasing number of inquiries about weeds and clean seed stocks. All in all, it is a situation well worthy of careful consideration and one upon which the man on the land is in the best position to bring research to bear upon the problem.

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Dr. J. R. Sanborn, formerly Research Bacteriologist for the International Paper Company, Glens Falls, N. Y., has been appointed to an Investigatorship established for the study of procedures for protecting paper milk bottles against possible contamination, and related problems.

RED LAKE, A PROMISING NEW CURRANT

THE Red Lake currant, introduced in 1933 by the University of Minnesota Fruit Breeding Farm, is the first worthwhile red currant variety to be offered to fruit growers since the introduction of Diploma in 1906. It has been well tested in many of the northern states and is well worthy of trial for market as well as home use. The large berries are borne on long, well-filled, long-stemmed clusters that are easily picked. The color is a clear light red and the quality excellent. The bush is vigorous, upright, and productive. In fruit characters Red Lake is as good or better than Perfection; in plant characters Red Lake is much superior.

THE RESULTS OF 50 YEARS OF BREEDING APPLES

Delicious Types Winning Favor With New York Fruit Growers—Red Sports Have Advantages Where Parent Varieties Do Not Color Well

by G. H. HOWE

IN the first article on the breeding of apples which appeared in the January issue of FARM RESEARCH only seedlings of McIntosh were discussed. Now we shall continue the discussion by setting forth the merits of other new apples, especially the seedlings of Delicious which are attracting considerable attention in this and adjacent states. It may be well to repeat that these new varieties of apples are being introduced by the New York State Fruit Testing Cooperative Association, Inc., Geneva, N. Y. Some nurseries are also growing them.

There are two new sprightly flavored apples which have been sent out for trial for special purposes. One is Carlton which is a very dark red seedling of Red Astrachan. It precedes Milton in time of ripening and is very attractive in appearance unless the color becomes so dark as to be a little dull as sometimes happens in certain environments. The variety has considerable merit for the roadside market as an apple for the customer to eat or to take home for culinary artistry. Several growers of Carlton have reported a nice profit from the fruit sold on the rural stand.

The other special-purpose sort is Red Sauce, a Deacon Jones X Wealthy seedling, which was named because the apples usually, tho not always, develop red flesh from which an attractive red sauce is made. The variety is large and well colored, but its only value is in the kitchen. It does cook unusually well and pies and sauce made from it are sprightly and refreshing.

Of all the new apples yet introduced the one to ripen earliest in the season is Lodi, a seedling of Yellow Transparent. Growers who have a market for Yellow Transparent should by all means plant Lodi. It surpasses its parent in every character. The tree is larger, more productive, and less susceptible to blight, and the fruit is more symmetrical, clearer colored, and better in quality and ripens a little later. Lodi truly is a handsome yellow apple in its season. In the opinion of a good many growers the market still demands a good yellow summer apple. For such a trade Lodi is unsurpassed.

Outstanding Delicious Types

OF all the parents of new apples, McIntosh and Delicious without any doubt have produced a greater number of meritorious offspring than any other variety used in our breeding work. The seedlings of McIntosh have already been discussed in the previous article. Let us now consider the merits of the seedlings of Delicious which have been named. The four which have been introduced to the trade are Orleans, Medina, Newfane, and Sweet Delicious. At the outset it must be said that it is not within the expectation of the writer that these Delicious types will ever attain the important place in the commercial apple industry in New York which the McIntosh types are likely to occupy; but there does seem to be a place for them for special purposes, at least under certain conditions.

Perhaps the one most widely planted is Orleans. Well grown it is a handsomely colored dark red apple having the Delicious shape and the Delicious dots and tone of color. Sometimes the apples are too dark and dull with too much scarfskin. The flavor is more sprightly than Delicious, but it has a pronounced Delicious aroma. Orleans is recommended to New York growers because the apples size up much better than Delicious, which usually runs small especially on older trees, and because they keep much longer. Some New York growers now comment favorably on the merits of Orleans. Growers in Wisconsin and Michigan also are finding Orleans a real addition to their list of varieties. The tree of Orleans seems to be exceptionally hardy so that it should commend itself to culture in the colder climates of the State.

Medina is as large as Orleans with the same shape, characteristically like Delicious, and similar in flavor and quality. The fruit will keep longer in storage than Orleans. Medina has the fault of not coloring as well as either Orleans or Newfane. The color is thin pinkish red over a golden yellow ground, the contrasting color making an attractive appearance, but not red enough to suit all growers. For a special market the variety merits a place for a Delicious-type apple on account of its quality and its ability to keep well in storage.

Perhaps the one of the Delicious seedlings which is most nearly a replica of a highly colored solid red Delicious is Newfane. In fact its color and general external characters conform closely to several solid red sports of Delicious now so widely advertised. Newfane is as mildly flavored as Delicious with the same distinctive aroma. Like Orleans, Newfane has been praised by growers in this and adjacent states. Two criticisms have been voiced, namely, that the trees are not overly productive and that they are less hardy than those of Orleans and Medina. Newfane is tender to cold in the northern climates. In the more tempered regions it should be tried because its handsome fruit of highest quality is finding ready sale at a good price.

Sweet Delicious is a large, well-shaped, dark red, sweet apple of surpassing quality. It inherits the characters of Delicious just as Sweet McIntosh has inherited those of McIntosh. The fruit retains its fine flavor and crispness of flesh till late spring. It is not too much to say that Sweet Delicious now is the best winter sweet apple to grow. No other of the old-time sweets are in any way comparable to Sweet Delicious and none of them should ever be planted again.

The Red Sports

SPACE forbids too long a dissertation about the merits of new apples, a subject on which much might be written. Nor is it possible to mention every new variety which has been tested at the Station. So far the discussion has hinged mainly around the apples which have originated at the Station, altho the Fruit Testing Association is distributing several new ones which have originated elsewhere.

There is a class of apples concerning which some notice must be taken in this article, namely, the red-colored sports of apples concerning which there is much lively speculation at the present time. The sports of particular prominence are Red Rome, Gallia Beauty, Red Spy, Starking, Richared, Red Gravenstein, and Red Duchess, to say nothing of innumerable others. All of these may or may not have a place in the apple industry under certain conditions. Further testing is necessary to appraise their true value. Suffice it to say, however, that the general planting of any of them should proceed with caution. Under certain conditions they may be more valuable than the older variety and under others it might be quite unwise

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Address correspondence regarding material appearing in these columns either to the Editor or to the author. More detailed information on the subjects discussed here can often be found in Station bulletins and circulars or may be had thru correspondence.

PRACTICAL RESEARCH

SCIENTIFIC research and newness go together. One naturally expects to see new things come out of research laboratories. In many instances, however, the new idea, the new process, the new product, or whatever form the result of a given research may take, may not at first seem to have any direct practical use.

This is especially true of scientific research as applied to agricultural problems. Our first impulse is to attempt to measure the results in terms of their application to everyday farm practices, or to try to determine their value to us individually in dollars and cents. This is not always an easy thing to do.

One of the chief aims of this magazine is to call attention to the new things developed in the Station's research projects and to show their practical application. Some of these are quite obvious, such as new varieties of fruits and vegetables, while others are less apparent.

In this number appears the second in a series of articles on new varieties of fruit and the first of three articles on new uses for fruits and vegetables. Also, because it, too, deals with new things, altho they are not necessarily the products of our own researches, we are printing in this and subsequent numbers Dr. Hedrick's presidential address given before the New York State Agricultural Society and entitled "New Crops for Old Lands". This entertaining and illuminating article was widely acclaimed by all of those who heard it when presented before the 105th annual meeting of this oldest of all New York State farm organizations.

And so "newness" dominates this number, as it does most numbers of FARM RESEARCH, but with increasing emphasis on the immediately practical.

NEW CROPS FOR OLD LANDS

by U. P. HEDRICK

MAN was first a hunter, next a herder, then a tiller of the soil. Even tho the domestication of animals and plants came in comparatively recent times, we do not know the home of many of their forebears. When man of our civilization appeared in Europe, he was already far advanced in agriculture and brought herds and crops with him.

The migrations of men, I need hardly remind you, have been going on for ages. Few parts of the earth's surface are now inhabited by their original peoples. Man seems ever to be restless, migration being an instinct. Taking the past as a criterion, we may assume that a century or two hence the distribution of races and peoples will be vastly different from what it is now. Wherever man goes, as a rule he takes his domesticated animals and plants with him. Thus our agriculture continually changes.

At the same time new foods and crops are ever appearing. With the discovery of the New World, corn, potatoes, peanuts, tomatoes, sweet potatoes, beans, squashes, and a score or more of lesser food plants came into world-wide cultivation. Sugar cane, sugar beets, and bananas are possibly the most noteworthy examples of food products introduced in modern times.

In 1800, there were no varieties of wheat and no attempt had been made to develop varieties. The introduction of Durham wheat, in the memory of all of us, brought to American agriculture in the last decade an extra forty million dollars. Since 1800, several hundreds of varieties of wheat have been introduced and as many more of other grains.

Another phase of the world's agriculture is the introduction in comparatively recent years of many crops not used for food. Admirable examples are tobacco, cotton, the poppy for opium, and many, many ornamental plants. Tea, now a world product, was known only in China until about 200 years ago. Coffee has been generally grown not much longer than 100 years. Cinchona for quinine, several plants for rubber, jute, and the cocoanut are examples of plants that have recently come into cultivation on a grand scale in tropical countries.

Many Factors Bring Changes

ANOTHER phenomenon occurs not infrequently, especially in these later days. The cultivation of a plant or even of an animal is greatly hindered by some hitherto untroublesome insect or disease which may be of small account in the home of the host. In a new land, the host is all but swept away. Almost every animal and plant is subject to this phenomenon. The chestnut blight and Dutch elm disease are the most talked of examples at the present moment.

Again, if the world would only stand still, if tastes, uses, and fashions in agricultural products did not change; if men did not have the divine curiosity that leads them to invent, discover, and originate; then there would be less need of new crops and new breeds and varieties of domestic animals.

However, the world does move. Nothing is permanent for any great length of time. New kinds of farm products will ever be developed to please the eye and the palate. New uses for farm products continually arise. The omnipotent spark of discovery and invention shows forth on the farm as in the laboratory.

These considerations lead me to say that if we take any period as a measuring stick, say 50 or 100 years, and measure from the beginnings of agriculture to the present time, we will find, I am sure, that there have been greater improvements in agriculture thru the introductions of new crops and new varieties of old crops and thru new breeds and strains of animals, than thru all the inventions, new methods, new discoveries of plant foods, new knowledge of the life and the control of pests, or new ways of storing and transporting agricultural products, all of which have so strongly marked our progress in agriculture during the past two or three centuries.

I have been speaking of world agriculture. Let us consider for a moment the agriculture of our own State. It is hard to picture New York farms without the potato. Yet in 1800 potatoes were grown only in small beds in gardens, and were everywhere regarded as not quite proper to serve at good tables because of their low Irish antecedents. In the 1830's and 40's an epidemic of potato blight swept all the varieties then known out of existence. A new potato from Chile was introduced in 1853. From this new potato came the Early and Late Rose, remembered by all of my age, which was the start of our present potato flora with its several hundreds of varieties.

Our navy bean dates from 1836 when Stephen Roe, Yates, Orleans County, grew 30 bushels, the first load of navy beans ever taken to market. Roe could not dispose of his product. Then came the Civil War which gave

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SPRUCE GALL APHIDS

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Fig. 2.—Immature females overwintering on the bark. This is the stage against which control measures are directed.

most vulnerable to the effect of insecticides or other agencies. This, of course, involves a careful study of the life cycle and habits of the aphids. In the case of the spruce gall aphid there are two generations each year. The insect spends the winter on the bark as a nymph or immature female (Fig. 2). They are usually located at or near the bases of the buds, most usually the terminal buds of the leader and the lateral branches. These nymphs feed on the cell sap and reach maturity about the time the buds begin to break in the spring.

Each female lays her eggs in a white, cottony mass at or near the base of a bud (Fig. 3), and the young aphids which hatch from these eggs feed on the new growth. The feeding of the female and the young aphids causes a definite swelling or gall to develop at the basal part of the new shoot. These aphids develop inside the gall and reach maturity as winged adults shortly after the galls crack open, come to rest on the needles, and deposit a mass of from 30 to 50 eggs. When these eggs hatch they give rise to another brood of young aphids which overwinter on the bark as indicated above. This completes the life history of the spruce gall aphid.

The life history of the Sitka gall aphid, while somewhat similar to the one just described, is much more complicated. In this species both primary and alternate host plants are involved, namely, Colorado or Sitka spruces and Douglas fir. There are five generations represented in its complete life history, which extends over a 2-year period. For purposes of control it may be said that its life history on spruce is essentially the same as that described previously for the spruce gall aphid except that the aphids, after issuing from the galls on spruce and transforming to winged adults, migrate to Douglas fir and lay their eggs on the needles. From these eggs other young aphids develop, spend the winter on Douglas fir, and become mature the following spring. After several generations on fir some of the winged forms migrate back to spruce and another gall-forming generation is produced. This migration to and fro from spruce to fir and *vice versa* is a continuous process, consequently it is possible for both host plants to be infested during the same season.

Experiments repeated over the past several years have clearly demonstrated that these aphids can be effectively controlled by one thoro application of any one of the mixtures indicated in Table 1.

Thoroness Important

THESE control measures are applied during the dormant season, the object being to kill the immature aphids which overwinter on the bark. Since practically all of these aphids are located on the undersides of the branches and usually quite near the tips, it is most essential to cover these parts of the tree thoroly in order to secure control.

If the spray-rig maintains a good pressure and the operator is careful to direct the mixture towards the tips and the under surfaces of the branches, it is an easy matter to secure a high degree of kill of the aphids. The time of application will vary somewhat with seasonal conditions, but in any event must be made when the trees are in a dormant condition.

Ordinarily treatment can be made any time between the middle of October and the latter part of April that weather conditions permit. If oil sprays are used the application should be deferred until spring, sometime before the end of April, because of the possibility of injury to the trees following freezing weather. The use of oil sprays are not generally recommended, particularly in home or ornamental plantings, since during some seasons, at least, they are likely to cause injury to the needles. Furthermore, oil sprays remove the bloom or bluish color on such types of evergreens as blue spruce and Douglas fir. Because of this the use of such spray mixtures as soaps or nicotine-soap are preferable, particularly for trees in home plantings.

Fig. 3.—Egg masses at the bases of the buds in the spring (about May 1).

TABLE 1.—VARIOUS TREATMENTS RECOMMENDED FOR CONTROL OF SPRUCE GALL APHIDS.

TREATMENT	MATERIAL NEEDED TO MAKE THE FOLLOWING AMOUNTS OF SPRAY MIXTURE	
	100 gallons	1 gallon
Soap Water	10 pounds* 100 gallons	2 ounces 1 gallon
Nicotine sulfate Hydrated lime or soap Water	1 pint 4 pounds 100 gallons	1 to 2 teaspoonfuls ½ ounce 1 gallon
Lime-sulfur Water	2½ gallons 97½ gallons	¼ pint (8 tablespoonfuls) 7¾ pints
Lubricating oil Emulsifier† Water	1 gallon (See footnote) 99 gallons	8 teaspoonfuls ——— 1 gallon
Miscible oils	Dilute according to recommendations of manufacturer	
Nicotine-lime dust, 2%	Use undiluted	

*Refers to soap on dry weight basis, such as laundry soap or soap chips. When using liquid soap, such as fish-oil soap, the amount should be increased in proportion to the percentage of soap solids in the mixture. For example, if a liquid soap containing 40 per cent soap solids is used, it will be necessary to add 2½ times as many pounds as indicated in the table above.

†Lubricating oils can be emulsified with the following: One pound of either calcium caseinate or lignin pitch (Goulac or Binderine) to 100 gallons of water or a 2–2–100 bordeaux mixture. Dissolve the emulsifier in about 1/10 the total amount of spray mixture to be used, pour in the oil, and agitate until thoroly emulsified before adding the remainder of the water.

CONTROLLING DAMPING-OFF IN GREENHOUSE AND COLD FRAME

Red Copper Oxide Spray For Post-emergence Damping-Off Proves Valuable Supplement To Seed Treatment.

by JAMES G. HORSFALL

THE Experiment Station has long been searching for the simplest, easiest, and cheapest method of stopping damping-off. Most of those who have followed this work are already familiar with the progress made in developing protective seed treatments like red copper oxide and zinc oxide. Many have made extensive use of these materials to prevent seed decay of peas, tomatoes, beets, and other plants. Last year something like 4 tons of red copper oxide were used in New York State alone to guarantee good stands of various crops.

The use of dusts to protect seeds against attacks of soil germs is excellent as far as it goes. It seems to be the best method yet for combating damping-off in the field, but no one knows better than the writer that something more is needed in the greenhouse. The advantages of steaming the soil to kill the damping-off fungi have long been known, and we have also studied the pasteurization of soil with electric heat. (See Bulletin No. 651 of this Station.) But however good these methods may be, they are too expensive for the small grower. Both are subject to the danger that germs may get back into the cooked soil and run riot there. The Station is seeking simpler and cheaper methods better adapted to the use of the amateur gardener as well as the big grower who may handle upwards of three million tomato plants, for example.

Here a new weapon is proposed for defense against damping-off in the greenhouse and cold frame. It is essential to start with a protective seed treatment, such as red copper oxide, zinc oxide, or organic mercury depending upon the crop. There is little point in going further with any program of damping-off control unless the seeds and tiny plantlets are first protected against disease attack before they emerge. Unless this is done, subsequent treatments are useless.

A protective seed treatment will assure a good stand of seedlings and a good start for them. It will control the pre-emergence damping-off. The next problem is to control the post-emergence damping-off, or the falling over of the seedlings.

Why The Seedlings Die

NOW seedlings fall over because they are attacked by soil microbes at the ground level which cause rotting until there is no stem left to hold them up. The loss of one or two such plants is not serious. The real fight only sets in then. When the fungus succeeds in bowling over one plant, it is encouraged to go for more which it may do with a vengeance. Having sucked the juices from the dying plant, it begins to spread outward with tentacles like an octopus in all directions knocking the seedlings over and getting nourishment from them as it goes. The attack spreads outward in circles like the waves on a pond when a pebble is thrown in. That is the reason why affected flats or greenhouse beds look moth-eaten. An occasional plant here and there in the flat falls over from disease and the fungus spreads thru the surface of the soil to neighboring plants.

Since the fungus cannot grow in dry soil we find that the disease is most serious under damp conditions. Since weak plants are more susceptible to attack than strong ones, we find the disease more serious in dull cloudy weather that weakens the plants than in bright weather.

The object is to stop the spread of the fungus thru the surface of the soil or to prevent it from attacking the healthy plants. What we propose to do is to wet the soil with a spray containing a chemical designed to kill the fungus, but which will not hurt the tender seedlings.

The Answer

RED copper oxide as a spray is the answer. It has been tried experimentally for two years now, both here at the Station and in commercial greenhouses. We would not recommend it if it had not been tried commercially. Red copper oxide should be dumped into the sprayer at the rate of 1 pound in 50 gallons, or 3 ounces per gallon, and sprayed heavily onto the surface of the soil and onto the plants so that it runs down the stems into the soil. When the fungus encounters this material, it is killed. At this strength the chemical does not seem to be especially toxic to seedlings, altho it has not yet been tried, on a very wide variety of plants.

In practice it is well to put one spray on the bare soil as soon as the seeds are sown. It is well to apply it about every week or 10 days as long as the plants are in the greenhouse.

In 1935 and 1936 growers reported some trouble in keeping the material from settling out in the sprayer, but during the past winter a new method has been found for keeping the material in suspension. This should solve the last problem in applying the chemical. The materials added to the red copper oxide will necessitate using probably 2 pounds instead of 1 pound to 50 gallons.

Since this new finding is quite recent, growers may find some difficulty in getting the new material on the market for the 1937 season. But even if the new material is not available, the old will control the disease just as well. The only difference is that it requires considerable shaking and agitation to keep it in suspension.

NEW MASTITIS TESTER NOW AVAILABLE TO DAIRY FARMER

THE Station has perfected a simple (brom thymol blue) test for use by dairy farmers to detect Mastitis. This test enables you to determine quickly if a pronounced infection exists in your herd. It is described in Station Circular No. 147. Test your own herd and eliminate cows with infection.

If you are a herd owner, interested in reducing Mastitis and avoiding high bacteria counts and costly losses in milk production, you will be interested in this test. Mastitis is one of the most serious problems confronting dairymen. The isolation or elimination of infected cows is the most promising method of control. Cows reacting to the brom thymol blue test should be be placed at the end of the milking line and milked last or, if possible, eliminated from the herd entirely.

The test is simple and requires no color charts or complicated apparatus. The set, with sufficient material for over 400 tests, may be secured for $1.75 C.O.D.

A post card addressed directly to the Station will bring you a set if you desire.

BEGIN STUDIES ON PAPER MILK CONTAINERS

Seek Methods For Protecting Paper Milk Bottles Against Bacterial Contamination—Also Hope To Set Up Fair Sanitary Standards For Paper Containers

by ROBERT S. BREED

NEW developments in the market milk industry bring new problems, many of which have a very real interest to the dairy farmer. All studies of the costs involved in the production, pasteurization and delivery of a quart of milk on the doorstep of the consumer in New York City show that more than half of the cost is in the delivery of the milk after it reaches the city. If this cost can be reduced in a way that brings increased consumption, the dairy farmer will benefit.

For years, various types of paper containers have been urged upon the dairy industry; and all are familiar with the paper cartons used generally by storekeepers as resale containers for ice cream, cottage cheese, or even cream. Fewer are familiar with the increasing use of paper containers in place of the common and often misused glass milk bottle.

About 10 years ago, one of the larger milk companies in New York City, after careful investigation, started bottling and delivering milk in a cone-shaped paper bottle. Other dealers followed their lead. The sale of milk in paper bottles met with certain consumer resistance; and other practical difficulties arose which have tended to limit the use of these paper containers to store trade and to half-pint packages for school use.

While the cost of the individual paper container is much less than that of the glass bottle, the fact that the latter is normally used 10 to 15 or even 20 times before it is lost or broken much more than offsets this advantage. Some types of paper containers also require special machines for filling with milk. However, the use of a lighter weight, single service package does away with collection, washing, and other costs, so that the matter of determining which type of container is more economical is a complex one, dependent on many things that are not evident to the uninitiated. Moreover, consumer reaction is an important matter to the milk dealer.

Use Is Increasing Rapidly

FOR 8 years the amount of milk sold in paper containers slowly but steadily increased in the greater New York area. About 2 years ago a new element was introduced into the situation by the organization of milk plants that put all of their output into these containers, concentrating on the sale of their product to schools and stores. These plants are equipped with machinery especially fitted to fill paper containers and the containers filled with cold milk are refrigerated in paper cartons that are handled more like standard groceries and canned milk than are heavy glass bottles.

This development has permitted real savings to the industry as well as to the storekeeper. Because consumer reaction has also been favorable and no bottle deposit is required, the use of paper containers has developed rapidly. The City Department of Health reports that at present approximately 2,400,000 individual packages containing quart or smaller quantities of milk or cream are used daily in New York City, about 600,000 of which are single-service paper containers.

In some sections of New York City, housewives so generally purchase their milk at stores and in paper containers that one of the speakers at

(Continued on page 14)

INVITED TO NEW ZEALAND

DR. G. J. Hucker, Chief in Research in the Bacteriology Division at the Station, has been invited by the Minister of Agriculture of New Zealand to spend four months in that country to study conditions relative to the detection and control of mastitis and septic sore throat and to confer with local officials on a suitable research program aimed to combat these troubles in the Dominion. Dr. Hucker will leave Geneva for New Zealand about the first of July.

Mastitis first came into prominence as a serious problem in New Zealand about 1903 and the dairy industry there has since gone thru much the same experience as have dairy farmers in New York State in attempting to combat the disease with various curatives and preventive measures. The extensive researches and publications of Dr. Hucker along these and closely related lines led the New Zealand authorities to extend their invitation for him to observe their conditions and aid them with his knowledge and experience.

NEW HYBRID SWEET CORNS

by W. D. ENZIE

IN trials carried on at the Experiment Station last year, 32 varieties of yellow hybrid inbreds, top crosses, and open-pollinated sorts and 6 white hybrids and top crosses were grown in a comparison of new hybrid sweet corns that might prove of value to New York State growers. The new varieties were compared with Golden Cross which, after 9 years, continues to be the standard of quality, yield, and uniformity among hybrid sweet corns. On the basis of quality, the following new hybrids were judged to have the greatest commercial possibilities.

Seneca Golden.—The most promising early hybrid to possess the desirable characteristics of Golden Cross. Originated with the Robson Brothers of Hall, N. Y., as a cross between Purdue 39 and an Extra Early Bantam inbred.

Whipcross 39–6.—A promising midseason variety originating with F. H. Woodruff & Co., Milford, Conn., from a cross between a Golden Bantam inbred, Purdue 39, and a Whipple Yellow inbred, C6.

Three Way Cross (1313 x 51) x P39.—In season with Golden Cross but possibly a little more vigorous, altho somewhat more variable in length of ear. Originated by G. M. Smith, U. S. Dept. of Agriculture, Purdue University, Lafayette, Ind., who was also the originator of Golden Cross.

Three Way Cross-Golden Cross x 14.—Another hybrid developed by G. M. Smith. A few days later than Golden Cross and of outstanding quality.

Bantam Evergreen Hybrid 24 x 39.—A large-eared variety for the main crop. Possibly a few days later than Golden Cross. Developed from a cross between inbred Bantam Evergreen No. 24 and Purdue Bantam, P39, and first introduced by the Associated Seed Growers, New Haven, Conn.

Bloomcross P39.—The latest maturing top cross hybrid in the test. Valuable chiefly for its high quality of both fresh and canned products. Originated with Landreth of Bristol, Pa., with P39 inbred as the seed parent and Bloomsdale Golden as the pollen parent.

Crosgreen.—Rated the highest in quality of the six white hybrids but lacked uniformity in length of ears and number of rows. Reaches canning maturity in 81 to 83 days with 86 per cent of ears in prime condition. Origi-

(Continued on page 8)

THE ROCK ALPINES

ACCORDING to the only authorities competent so far as we know to write on the subject, the Swiss dairy goats are lineal descendants from animals brought down from the Alps Mountains and developed as to type in the various provinces according to the fancy of their possessors. In one province white was admired so the Saanen resulted. In another region dark colors with white markings were preferred and the Toggenburg was produced. Genetically and racially both were Alpines and still are so far as origin is concerned. The English author C. J. Davis speaks in his book of "British Alpines", and pictures and describes a perfectly marked Toggenburg with a black base as the only variation.

Mrs. Mary E. Rock in originating the family named "Rock Alpines" on her estate near Santa Barbara, Calif., simply used enough of the original tribe imported from the Alps to re-establish and keep dominant the primitive type and character of the breed which combined the White Alpines or Saanen, as pure as could be found, and the dark-hued Alpines, or Toggenburgs. Hence, her Rock Alpines are a re-combination solely of these lines of Alpine goats with the only chance of admixture of any foreign element or impurity being that coming thru the remissness of Swiss breeders of the Saanen and Toggenburg clans. But as only the choicest in pedigree and individuality were accepted and used, racial purity would seem the best that can be asserted of any milk goat variety known.

The truth of the matter is that there is virtually no cross breeding involved, the tribal difference going no deeper than coat color and affecting in no wise the vital characteristics of blood, racial type, quality, or character. The Alpine color prevails as fixed and definite, being white with black blends in iron gray, cou blanc, cou clair, chamoise, and sundgau.

(The information upon which this item is based was supplied by Mr. Don N. Allen of Wayland, N. Y., past president of the New York State Goat Society.)

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HYBRID SWEET CORN

(Continued from page 7)

nated by the Connecticut Experiment Station, as a first generation hybrid between Crosby and an Evergreen inbred, No. 77.

Top Cross Crosby.—Matured 10 days earlier than Crosgreen but was variable in maturity. The most promising of the early white hybrids; not yet in commercial production.

Good Hope Princess Barbara, a 2-year-old Rock Alpine Doe, representative of the only breed of goats developed within the United States.

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NEW APPLES

(Continued from page 3)

to plant the red type. In selecting varieties for a proposed planting the grower should make it a rule always to scrutinize carefully the list of recommended apples and to seek advice and the latest information in making a choice of those kinds best adapted to his location and for his market.

Let us consider for a moment specific red sports. There are advertised now solid red McIntoshes labeled Black Mack, Black Mickey, Blush McIntosh, etc. There seems to be little difference between these and any solid red McIntosh. So long as the red is deep and solid all over and not striped with much green showing thru any one of these will do. A grower should be certain that he is planting a good solid red strain. It is interesting to note that the original McIntosh tree bore solid red apples and that the striped McIntosh, all too often grown commercially, has sported from the original.

The two red sports of Delicious most widely advertised are Starking and Richared. Growers who have studied both strains seem now to be agreed that the Richared is the better of the two in that the color is a little clearer and less spotted.

Various Red Romes, and Gallia Beauty is one of these, are on the market. Most of the apples under the name Red Rome have been criticised because they lack size. Gallia Beauty, on the other hand, seems to have escaped this criticism. Growers are united in the observation that Gallia Beauty sizes up satisfactorily and its bright red color is always attractive.

The subject of red sports of apples can be disposed of by a single assertion. If Rome Beauty, Northern Spy, Duchess, or Gravenstein fail to color well in the locality in which they are grown, then some good red sport of these sorts is probably preferable. It is doubtful, however, if it will always pay to set a red strain where the older sort takes on a color sufficiently attractive so that the fruit markets to good advantage. But with McIntosh there can be no question of a choice between a solid red McIntosh and a striped one. Again, let advice be sought in connection with a proposed planting of apples.

Crab Apples

THIS article would not be quite complete without a word about crab apples. Since money can occasionally be made from growing a few trees of this fruit they should not be entirely overlooked.

Two new sorts, Dolgo and Young America, are worthy of consideration. These, with the well-known Hyslop, should make up the crab apple list for most purposes. Dolgo is a small, distinctly oblong apple, colored with beautiful bright solid red and heavy bloom — the handsomest little crab apple ever seen. As an ornamental it quite outstrips several of the commonly cultivated ornamental kinds. The fruit is full of sprightly juice, jellies easily, and makes a most beautiful ruby-red jelly of the highest quality.

Following Dolgo in season comes Young America, a variety much larger and just as attractive in color. This sort, too, serves the dual purpose of ornamental decoration and fruit usage. Jelly made from the fruits is a clear beautiful red and splendidly flavored. Every September the housewife should be able to find in the market a generous supply of Dolgo and Young America. It would seem that the culture of two or three superior crab apples such as these might bring to the grower both pleasure and profit.

(This is the second of two articles by Professor Howe on new apple varieties. Later, Professor Howe will describe new varieties of other tree fruits.)

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The American Goat Society has again sought the cooperation of the Experiment Station in the conduct of the third national goat's milk scoring contest to be held in May. At their request, Prof. J. C. Marquardt of the Station Dairy Division will again serve as general director of the contest. This will run Professor Marquardt's score to 98 state and 3 national contests of this nature.

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VITAMINS FOR CALVES

(*Continued from page 1*)

and Feeding that, "Vitamins A and D are of great importance in raising dairy cattle for they often suffer from deficiencies of these vitamins. Nevertheless, when calves are fed the usual type of satisfactory ration, including plenty of good hay, there is no need to add a vitamin A or D supplement."

PEAR MIDGE CONTROL

by F. G. MUNDINGER

ONE of the most important steps in the control of the pear midge is the timing of the spray application. This is determined by the stage of development of the blossom buds in the warmer portions of the orchard. When the more advanced buds of a cluster have swollen so that the green sepals have begun to spread apart, usually revealing a trace of pink of the petal between them, it is time to spray the entire orchard. (See illustration.) About this time the majority of adult midge flies are present and can be destroyed before they are able to deposit many eggs in the buds.

Some of the mixtures effective in controlling midge are stated below with the amounts of materials for 100 gallons of spray: (1) Lime-sulfur, 2½ gallons; nicotine sulfate ¾ to 1 pint; (2) summer oil emulsion, 2 gallons; nicotine sulfate, ¾ to 1 pint; (3) potash or resin fish-oil soap, 3 pounds; nicotine sulfate, ¾ to 1 pint; (4) copper sulfate, 2 pounds; lime, 10 pounds; nicotine sulfate, ¾ to 1 pint; or (5) strong lime-sulfur alone, 11.5 gallons; summer oil alone, 2 gallons actual oil, will also give commercial control during some seasons if the application is accurately timed.

When spraying for pear midge, the entire tree should be wetted, including the trunk and lower branches, since the adult flies often seek shelter in the cracks of the rough bark when disturbed. Furthermore, it is well to spray against the wind so that the flies are not subject to the repellent fumes of the mixtures but can be hit by the spray before they are able to escape.

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F. E. Gladwin, in charge of the Station's Vineyard Laboratory at Fredonia, has been promoted from associate to chief in research in pomology on the Station staff.

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Mrs. J. C. Hening has been appointed Station Librarian to fill the vacancy occasioned by the resignation of Mrs. Aubrey Crawford.

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Dr. F. E. Lovelace, assistant chemist, was transferred from the Division of Chemistry to the Dairy Division to fill the position vacated by Dr. J. J. Kucera when the latter returned to his home in Czechoslovakia. Dr. F. A. Lee was then advanced to Dr. Lovelace's former position and Dr. F. F. Hayward appointed as assistant chemist to fill Dr. Lee's place.

NEW FRUITS

THE New York State Fruit Testing Association has the following new varieties available for spring delivery. Many of these new fruits originated on the Station grounds and all of them have been under test here for some time. A descriptive catalog and price list may be obtained by addressing H. L. King, Manager, Box 299, Geneva, N. Y.

APPLES
Carlton
Macoun
Newfane
Red Gravenstein
Medina
Orleans
Sweet Delicious
Early McIntosh
Milton
Lodi
Melba
Ogden
Red Sauce
Young Amer. Crab
Dolgo Crab

PEARS
Cayuga
Dana Hovey
Pulteney
Clyde
Ovid
Willard
Ewart
Phelps

PLUMS
Beauty
Imperial Epineuse
Formosa
DeMontfort
Santa Rosa
Calif. Blue
Early Laxton
Monitor
Surprise
Washington
Yakima
Red Wing

CHERRIES
Early Rivers
Royal Duke
Seneca
Lyons
Hedelfingen
Vineland 160,133

PEACHES
Oriole
Viceroy
Valiant
Mikado
Cumberland
Golden Jubilee
Sunbeam
Veteran

RASPBERRIES
Bristol
Sodus
Taylor
Newburgh

NECTARINES
Hunter

GRAPES
Sheridan
Dunkirk
Hanover
Wayne
Fredonia
Seneca
Ontario
Urbana
Watkins
Erie

STRAWBERRIES
Camden
Clermont
Cato
Culver
Catskill

ELDERBERRIES
Adams

GOOSEBERRIES
Fredonia

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NEW CROPS

(Continued from page 4)

the navy bean a grand start and soon New York State was annually producing two million bushels of beans and the crop became a standard in the State and country.

Red clover was a rarity in 1800. Timothy came from Europe in 1720, but was little grown until hay was needed for the New York State turnpikes and towpaths. Alfalfa was introduced to New York farmers by energetic Robert Livingston in 1790, but the crop had no standing until as late as 1900, when the technic of curing the hay and of inoculating the soil had been discovered. In 1900 there were about 5,000 acres of alfalfa in New York State. Now there are approximately 400,000 acres. The soybean is now in about the same stage of popularity in New York State that alfalfa was in 1900.

Livestock Of Recent Origin

ONLY two breeds of horses were common in New York in 1800, the Naragansett pacers for riding and buggies and the Conastogas for draft horses, altho Sir William Johnson had brought over Irish hunters and a breed of draft horses known as Suffolks at a much earlier date. Most horses in 1800 were scrubs, no attention having been paid to their breeding. George Washington bred the first mule to make itself heard on an American farm. Holsteins were introduced about 1794; Ayrshires in 1800; Shorthorns in 1830; Jerseys and Guernseys about 1840. All other breeds came into the country and state later, altho possibly I ought to say that these dates are approximations, since there are many rival claims as to when breeds of animals were brought to America and by whom.

By common consent, Robert Livingston is given credit for introducing the Merino sheep, New York's first blooded animal. All other breeds came later. In passing, it may be said that the introduction of the Merino sheep brought about in the early nineteen hundreds one of the most terrific speculations in which American farmers have ever indulged.

Pigs were half-wild animals in 1800. Nearly all breeds have been introduced since.

Our poultry industry, running into possibly $50,000,000 a year in this State, is founded on breeds evolved since 1800. All of the older men here remember when most of our fowls were nameless as to kinds and lived on the farm manure pile.

In 1800, tree fruits were mostly unknown seedlings. At this date there were in America almost no named small fruits. Our American species of grapes, strawberries, raspberries, blackberries, dewberries, cranberries, and huckleberries have all been domesticated since 1800. Since that date New York gardens have been enriched by tomatoes, sweet corn, cauliflower, broccoli, celery, eggplant, peppers, spinach, and cantaloupes, of all of which there are now hundreds of varieties, and still other hundreds of new varieties of other vegetables. Seed farming, floriculture, ornamental gardening, and the growing of nursery stock are industries built up since 1800.

(From the Presidential address delivered by Dr. U. P. Hedrick before the 105th annual meeting of the New York State Agricultural Society at Albany, January 26, 1937. To be continued.)

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"Brewer's Gold", a promising new hop variety developed in England in recent years, has given outstanding results in tests in the experimental hop yard maintained by the Experiment Station near Waterville. It is to be tested further for its resistance to downy mildew.

FIRST HAND OBSERVATIONS ON CHEESE MAKING IN GERMANY

Output Almost Wholly Consumed Within The Reich With Wide Range Of Varieties To Meet All Tastes—Government Encourages Elaborate Research Program

by J. C. MARQUARDT

A LARGE percentage of the cheeses made in Germany are consumed there. The cheese-making areas are not very extensive, and Germany has several large cities which readily consume much of the product. Also, the types of cheeses commonly made in Germany are not suitable for export.

There is a demand in Germany for cheeses with a high moisture content. This means that rapid-curing types are manufactured and are consumed soon after being made. This in turn results in rather highly flavored cheeses. Frequently, with certain varieties, high salt content is encountered to add to the flavor of the cheeses.

A new development in Germany is the making of cheeses of a given variety from milk containing various amounts of fat. For example, a very popular variety is frequently made from milk containing 1.0, 1.8, and 3.0 per cent of fat, or a like range. The purpose of this is to give consumers an opportunity to buy a given variety of cheese at a price they are able to pay.

This is also very significant from the standpoint of the national policy of Germany. This regulation indicates that there will be cheese for all in the future and is quite different from the regulations governing butter consumption, which discourage the liberal use of butter in an endeavor to conserve fats. These developments have more than a passing interest.

Quality and composition are carefully checked by the government which is also actively interested in supplying cultures to the cheese industry in an effort to improve the quality of the cheeses. The government is encouraging the making of all cheeses from pasteurized milk. To the German cheese industry this means heating the milk to 71°C (159.8° F) for 40 seconds. Occasionally a temperature of 85°C(185°F) without a holding period is employed. Heating the milk to 63°C(142½°F) for 30 minutes, as commonly practiced in this country, is never used in Germany in heat treating milk for cheese making.

Tilsiter A Popular Variety

A POPULAR cheese variety in Germany is Tilsiter made mainly in northern Germany, altho it can be purchased in all parts of the country.

Arrangements for receiving milk at the combined dairy plant operated in connection with the Dairy Research Institute at Kiel. Many problems of interest to dairymen are studied at the Institute by more than 280 scientific and technical workers.

It is made in a very simple manner, requiring little in the way of time, effort, equipment, or supplies. The curd is salted lightly and the main salting is achieved by brine immersion or salt rubbing. This variety cures very rapidly. It does not develop a heavy rind. It is ready for the market within 3 weeks of the date of manufacture and most of it is consumed within 6 weeks after it is made. The cheeses are not paraffined. Tilsiter has an open texture with numerous small holes. Its flavor is rather strong. The variety is well suited for German requirements, and it may be regarded as the cheese variety of distinctly German origin.

Another cheese made by a method very similar to the Tilsiter method is called Hollander cheese. An Edam cheese, resembling the Edam cheese of Holland, is also made in Germany in a limited way. Its quality is very high. However, the so-called Hollander cheese is a special variety of cheese. Hollander cheese, like Tilsiter cheese, is usually made into 15-pound flat round cheeses.

In Germany, as in all other countries, one variety of cheese is generally typical for a given section and is made in a limited way. This is true of Wilstermarsh cheese made at Itzehoe and one other place in the region just north of the Elbe River. It is made in a manner similar to the Tilsiter process with variations in cooking and pressing which result in a moisture content ranging from 45 to 50 per cent. This in turn produces a typical flavor for which the cheese is noted in northern Germany. The cheese cures very rapidly.

Southern Germany is the home of many varieties of soft cheese. Camembert is made extensively in southern Germany, altho there are two Camembert factories in northern Germany.

Cheeses similar to our limburger are also made in southern Germany. They are sold under a variety of names depending mainly upon the size and shape of the package. A popular variety of this type is known as Romandur. It contains either 20 or 40 per cent of fat and is cured at 15°C (59°F). A smaller cheese of this type made only with 40 per cent of fat is known as Delikat. It is a popular breakfast cheese.

Other Distinctive Cheeses

SAINT Stefano cheese is made in Germany in a limited way. It resembles Bel Paese cheese and is cured at 3°C (37.2°F). This cheese is made from high fat content milk. Kümmel Käse and varieties too numerous to record are made in a very limited way. It is hardly feasible to list all of these as typical cheeses. Kümmel Käse, however, is made rather extensively.

Emmenthaler cheese, commonly called Swiss cheese, is being made in southeastern Germany and the government is encouraging its manufacture. There is a good possibility that this cheese will be made more extensively in Germany in the future.

Like our states, certain provinces of Germany take pride in the production of certain cheeses either in quality or quantity, or both. Schleswig-Holstein, for example, takes pride in the production of Wilstermarschkäse and Gouda, while Pommerania stakes its cheese reputation upon its limited Camembert production.

(Continued on page 11)

Two of the main wings of the Dairy Research Institute at Kiel. A good conception of the massiveness of the structures is obtained by viewing these photographs.

WHY IS ONE HALF OF A PEACH LARGER THAN THE OTHER?

by H. B. TUKEY

IT is common observation that many peaches, cherries, and plums have fruits which are unequally sided, the one side or "half" of the fruit being more fully developed than the other. Furthermore, the larger side may often be more highly colored, more highly flavored, and may soften and ripen earlier. In some varieties this is quite pronounced, as in the Imperial Epineuse plum where in some seasons the smaller side remains hard and green and fails to develop to good edible and marketable condition, altho the larger side matures and ripens properly.

Likewise, the Crawford type peaches and fruits with a pronounced bulge or "belly" show an uneven development of sides to a marked degree. In other varieties, with fruits smooth in contour and more round or oval in shape, the unequalness of sides is less noticeable.

The pit also shows development similar to the flesh, the over-developed half of the pit being on the same side as the over-developed half of the flesh. This relation between pit and flesh, however, is to be expected, since the pit and flesh together constitute the fruit, the inner portion of which becomes hard and separates as the stony pericarp or pit, while the outer portion becomes soft and is the fleshy pericarp or edible portion of the fruit.

This unequalness of halves seems to be associated with development of the seed. A peach fruit consists of a single carpel containing two ovules. On each carpel an ovule is borne. Just before full bloom and prior to fertilization, one ovule aborts, altho occasionally both may persist, more commonly in some varieties than in others. The remaining ovule develops into a seed.

In the case of unequally sided fruits, examination of the pit at the point of attachment of the seed shows that the seed is attached to the larger and better developed side. In instances where both seeds develop, this difference between sides is not apparent and the fruits appear symmetrical. It is thus possible to forecast the side to which the seed is attached by observing the larger and better developed side, either of the flesh or of the pit.

The arrangement of the vascular system of fruits of the peach offers a ready explanation for this situation. The dorsal suture of the carpel (identified as a single line running from the apex to the base) may be thought

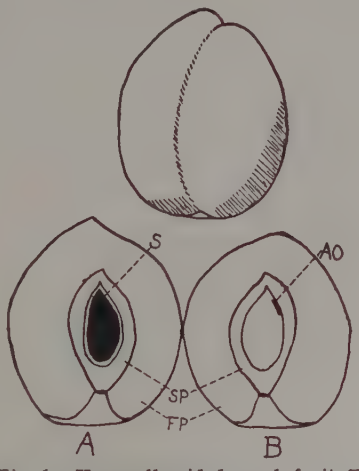

Fig. 1.—Unequally sided peach fruit. The side of the fruit (A) to which the seed (S) is attached is more fully developed than the side (B) to which the abortive ovule (AO) is attached. SP = stony pericarp (pit); FP = fleshy pericarp (flesh).

of as the midrib portion of a folded leaf, and the ventral suture (identified by its broadness and double fold appearance) as the region where the two edges meet. Altho the edges are adjacent, there is no actual union along the ventral suture of the pit at the upper end. Accordingly, while the two ovules lie adjacent within the pit they should really be considered as tho they were attached to the outer edges of a folded leaf.

The two ventral bundles, which supply vascular connection to the ventral region of the fruit are thus widely separated structurally, altho adjacent in their position in the fruit. Since a growing embryo establishes a gradient toward which food materials move and favors the development of the associated vascular system, it might be expected that the side of the carpel to which the embryo is attached would be the side more fully developed.

Finally, it is well known that the set of fruit is affected by fertilization and seed formation. More recently it has been shown that the development of an embryo within the developing fruit may affect the development of that fruit as a whole. Now it appears that in the case of a simple fruit the position of the embryo in relation to the carpel and its point of attachment to that carpel markedly affects the shape and development of even a portion of the fruit.

GERMAN CHEESE

(Continued from page 10)

The Rhine provinces think only of their quality Gouda and Edam when considering cheeses, while in Thüringen in central Germany, much interest is manifested in making Altenburger, a goat's milk cheese. This province and Baden also produce quality sour milk cheeses and Münster. Württemberg and the Bavarian Allgaü are actively engaged in making what we commonly call Swiss cheese.

In the Bavarian Voralpenland cheeses similar to limburger are made; and Camembert and Brie made in this area are referred to as luxury cheeses. It is of interest to note that this region produces the only mold-ripened cheese made in Germany. This cheese is made in a limited way only in Waging near Traunstein.

East Prussia centers its cheese interest in Tilsiter cheese. In this province there is a cheese school which offers courses in Tilsiter cheese making; in fact, all of the cheese areas have cheese schools which give instructions in the art and science of cheese making.

Cheese Research Stressed

GERMANY, as well as other European countries are rapidly absorbing the idea of processed or package cheeses as we know them. The German government plans to experiment extensively in this field. Processing plants and very elaborate packaging equipment are rapidly being introduced into Germany and other European countries. Modern ways of living and the convenience of the packaged product seem to appeal strongly to the European consumer.

The German cheese industry offers several points of interest to our cheese industry. In visiting German cheese plants, one is impressed, for example, by the utilization of whey, the improvement of the quality of whey cream, and many other minor points in the manufacturing process.

Under the third Reich there is a strong tendency to centralize research combined with a sharp demand for technical services. In this development there is a tendency to decrease the activities of the so-called dairy schools. This means that the cheese industry cannot depend upon these schools for its new leaders. In this respect the situation is unique, and there is concern over the possibilities of the industry developing outstanding leaders. Men comparable in ability, diligence, and general character to those who are retiring appears to be the urgent need of the German cheese industry today.

(Professor Marquardt recently returned to the Station following a stay of several months in Germany where he made an intensive study of the German cheese industry.)

CORRECT HANDLING OF TOMATO PLANTS PAYS

Has Important Bearing On Early Growth So Necessary To Production Of High Yields Later—Home-grown Vs. Southern-grown Plants

by W. T. TAPLEY

THE methods used to grow and handle the millions of tomato plants required to set the canning acreage in New York State have a direct bearing on the total yield to be expected from those plants. The ideal plant when properly grown and hardened is described by a leading grower as short, stocky, strong, healthy, vigorous, having dark green leaves and stems, and a large compact fibrous root system. The tomato grower should exercise care to secure the best plants obtainable and to handle those plants previous to and thruout the period of field transplanting in such a way as to insure rapid recovery, quick growth, and a minimum of actual plant loss.

There are three main sources of plants available: (1) The plants may be produced on the home farm; (2) the grower may contract with the local canning factory or with a local plant grower for his plants; or (3) he may purchase southern grown plants, either thru the local canning factory or directly from a plant grower in the South.

Home-grown Plants

PROVIDED the grower has available the right equipment, it is probable that he can grow better plants at home than he can secure elsewhere. In the growing of plants it is necessary to time the various operations correctly in order to bring the plants along at the right time. This is difficult for no two seasons are alike either as to the period during which the plants are being grown or in respect to the date when the plants may be set in the field. Seven to eight weeks should be allowed from time of seeding to the date of setting out in the field.

There is a tendency in certain sections to start the plants too early. In starting plants too early there is the possibility that they will have to remain in the flats for too long a period. The soil in the flats becomes filled with roots, the plants are then root bound, plant food becomes exhausted, and the smaller and younger roots die and decay. In this condition the plant takes longer to recover, develops slowly, and the resulting crop is often late and below the average.

Starting the plants early may also result in rather tall slender plants or in plants which have been badly checked in their growth processes because of the necessity of holding them back. Holding back plants may be accomplished by withholding water. This results in plants which show a yellowing of the foliage, a thick woody growth, and a restriction of the actual leaf size. Increasing the ventilation or gradually subjecting the plants to colder temperatures will also hold them back, but if carried to extremes may produce tree-like plants, which are woody and have little foliage.

Fig. 1.—Wilt of a month old John Baer plant produced by inoculation of the soil with the new Fusarium wilt-producing organism. The plant was potted Nov. 28, 1936; the soil inoculated without injury to the root system Dec. 21, 1936; photo taken Jan. 22, 1937.

The tomato grower in New York is fortunate in that the climate of the State is adapted to tomato production. This is reflected in the high average yields compared with those of other states. This State has a climate which is naturally favorable to the growing of productive, disease-free plants.

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A POSSIBLE NEW WILT DISEASE OF TOMATOES

Isolated From Plants Growing In Rochester Area Last Season—Extent And Importance Of Disease To Be Studies This Season

by OTTO A. REINKING

THE common Fusarium wilt of tomato caused by *Fusarium bulbigenum* var. *lycopersici* has not been reported as being serious in the tomato-growing areas of northern New York. The generally cooler growing seasons may account for this, for the disease is known as a more southern type of trouble. It may be possible, however, that the organism has not obtained a foothold. Some tomato growers of recent years have been using southern grown plants. This practice may lead to the introduction of diseased plants and a gradual increase in disease.

During the hot and dry growing season of 1936 a tomato wilt was reported from the Rochester tomato region. Examination of plants in the field from three of these areas showed typical wilt symptoms. Microscopic examination of the discolored water-conducting tissues of plants showed the presence of a fungus mycelium. Cultures made from diseased plants appeared to be different from that of the common wilt organism mentioned above.

In all three instances of disease examined the same organism was found to be present in the plant tissues. Inoculation experiments were conducted to prove the pathogenicity of the new organism. Inoculations made in the soil on December 21, 1936, around 1-month-old John Baer plants growing in pots, produced a typical wilt that started on January 16, 1937, some 25 days after inoculation (Fig. 1).

Upon examination of the diseased vascular tissues under the microscope, they were found to be full of the fungus mycelium. Re-isolations made from these diseased plants resulted in obtaining the same organism that was used for inoculation. The fungus had spread thruout the entire upper parts of the plant growing into the tips of the leaves, but up to the time of the examination not into the young developing fruits. All controls remained healthy.

A New Organism

CULTURE and morphologic studies conducted with the organism in question showed that it apparently was different from the ordinary wilt organism. It is proposed therefore to assign the temporary name of *Fusarium bulbigenum* var. *lycopersici* f. 1 to this new organism. Studies are being continued for a final determination.

It is not known how generally wide-

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HANDLING TOMATOES

(Continued from page 12)

Southern Plants

THE growing and shipping of tomato plants is a well-established business in the South. It is now possible to purchase certified southern plants. These are plants which have been grown according to certain specifications and regulations enforced by officials in the state in which they are grown. Production methods and shipping methods have improved. Well grown plants free from disease and insects, well packed, and delivered within two days after pulling may give a satisfactory crop.

The successful use of southern plants may well depend on how quickly they can be handled. If they have been two days in shipment after being pulled, any considerable delay in setting them out because of bad weather or lack of labor or the failure to have land fitted, may cause a rather high percentage of plant loss. When the plants are received they should be unpacked and trenched in sandy or loose ground and watered. This will cause new root development and the plants can be held several days.

Results are often compared between locally grown and southern plants. When fields planted with well-grown local plants are compared with southern-grown plants, the comparison is usually in favor of the local plants. But when poorly grown local plants are used, then the comparison may be in favor of the southern plants. The emphasis should be placed on having good plants. If it is not possible to grow good plants at home or to obtain them from a local plant grower, then it may be best to seek them elsewhere. Every precaution should be taken to have these plants free from disease and insect infestation. The diseases which may be brought in with southern plants are collar rot, bacterial canker, fusarium wilt, and Septoria leaf spot. Only plants grown by reliable growers and certified by the inspection service of the state producing these plants should be used.

Plant Hardening

THE "hardening off" process serves to acclimate the plants to out-of-door or field conditions. Hardening of the plants usually is necessary, but this does not mean that they should be abused by drying out or by very nearly freezing by sudden exposure to cold or chilling winds. In May it is natural to increase the ventilation given the plants in the frames, even removing all protection during very mild periods; but protection should be provided when the temperature goes below 40° or when chilling winds and cold rains occur. Hardening the tomato plant will not protect it against frost.

Normally, the hardening process should begin a week or 10 days before the plants are ready to set in the field. Gradually subjecting the plants to more air, cooler temperature, and less moisture slows up growth and may delay early fruiting. Care should be used not to carry this too far. The change in temperature and moisture supply should not be too abrupt. Plants which have received a serious check in growth seldom recover fully and yields are greatly reduced.

Field Planting

WHEN plants are at hand and the fields are ready, no effort should be spared to transplant them to their new location as quickly as possible. One definition of the word transplant is "to remove and settle or establish for residence in another place". Rapid progress after setting depends upon the recovery of the plant and the starting or growth of new roots. The plants should be wet down thoroly before transplanting, the roots disturbed as little as possible, and if a ball of earth remains on the roots so much the better.

After danger of frost has passed the earlier the plants can be set the higher the yield. Early set plants have the advantage of a larger moisture supply, thus insuring a larger plant before high temperatures are common and likewise advancing the period of bloom and the number of blossoms.

The question of hand setting or machine setting is one which can best be determined by the individual farmer. The plants, the size of the acreage, the weather conditions, and the labor available, all have a bearing as to which method should be used.

As the result of numerous experiments involving the growing of tomato plants carried on at the Station, during the past 10 years, the following recommendations can be made to tomato growers: (1) Do not plant tomato seed too early, allow from seven to eight weeks growth before time for field planting. (2) Provided danger of frost is past, the earlier plants can be set in the field, the greater the yield expectancy. (3) Avoid what might be termed severe or abrupt changes in temperature or moisture supply to the plants, i.e., go easier on the hardening process. (4) Water the plants before setting in the field and disturb the root system as little as possible in handling. (5) Aim to secure the best plants possible. (6) Spray plants at 10-day intervals as described in the article on page 6 on damping-off.

STATION WORKER CALLED TO CUBA

RECOGNITION has recently come to one of the members of the Station staff which brings out an unusual relationship between a useful and desirable fermentation in the making of sauerkraut and a fermentation of sugar cane and beet juices that causes much trouble for sugar factories. Dr. Carl S. Pederson of the Bacteriology Division, some years ago, pointed out that the early stages of the fermentation and the production of desirable flavors of sauerkraut were due to a lactic acid coccus which he was the first to recognize as being identical with the bacteria producing the so-called "frogs egg" deposits found in the pipes of sugar factories.

Because of Dr. Pederson's investigations, he has been granted leave of absence to study these organisms in Cuban sugar factories. Dr. Pederson left for Cuba late in January and expects to return about the first of April.

This "frogs egg" growth is much like the gelatinous masses of certain blue-green algae found in fresh-water swamps and known as *Nostoc*. As the organisms in the two different types of jelly are much alike in microscopic appearance, the bacteria forming this jelly growth in sucrose solutions were named *Leuconostoc*, or "white *Nostoc*", to distinguish them from the blue-green alga known simply as *Nostoc*. This was done by a Russian scientist who identified and studied these bacteria as long ago as 1878.

The same bacteria that form the jelly in juices containing sucrose grow freely in cabbage, tomato, and other plant juices containing glucose with no formation of jelly. Likewise, these same bacteria have been found commonly in dairy products and are recognized as aroma-producers in butter starters.

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TOMATO WILT

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spread and destructive the disease is. It is hoped that further data may be obtained during the growing season of 1937. From the behavior of other Fusarium wilt troubles of plants it might be expected that new strains of wilt-producing organisms may arise. It is essential, therefore, that a careful check be continually made in order that we keep abreast of the situation and in this way be in a position to advise control measures as they become necessary.

In this instance, if the disease develops, it may be essential to produce new resistant varieties that will offset the ravages of the disease. Studies along these lines will be continued.

NEW USES FOR FRUITS AND VEGETABLES

by DONALD K. TRESSLER

NEW YORK is one of the leading States in the production of fruits and vegetables. Our State stands first in the production of snap beans and cabbage, second in the growing of green peas, apples, grapes, cauliflower and asparagus, and third in the case of cherries, tomatoes, carrots and cucumbers. It also ranks high in the production and preservation of many other fruits and vegetables.

Our fruit and vegetable growers are very fortunate in having close at hand the best markets in the country. New York, Buffalo, Rochester, Syracuse and several other large cities within the State are excellent markets. Philadelphia, Boston, Cleveland and Pittsburgh are not far away. Even so there are gluts caused by over-production, and there are always large quantities of second grade fruits and vegetables which are of good flavor but do not possess the appearance required for sale in city markets. In the case of apples, for example, the quantity of second grade and cull fruit that goes to waste annually is very large indeed, running into the thousands of tons.

Because of these conditions, any novel uses of fruits and vegetables which may take large quantities of these products are of interest, as they not only prevent market gluts but also may make use of the second grade and cull fruits and vegetables which at present are difficult to market.

I refer particularly to the new quick freezing and dehydrating processes and to the great new fruit and vegetable juice industries. These and some other processes of lesser importance will be considered in detail in this paper.

Quick Frozen Fruits And Vegetables

ON November 23 I attended in Washington the Centennial Celebration of the American Patent System. The outstanding event of that celebration was a great dinner at the Mayflower Hotel which was attended by more than a thousand of our leading scientists, inventors and government executives. The frozen foods served at that dinner included lobster, red perch, turkey, lima beans, squash, asparagus, sweet corn, raspberries, and strawberries. This is a well deserved recognition of the excellence and rapidly increasing importance of these foods.

Most persons think of the freezing of foods as a recent development. However, the freezing preservation of meat, fish, and poultry has been of commercial importance ever since the advent of artificial refrigeration. Neither is the freezing of fruit new, being employed first in this country about thirty years ago. In 1910 it was introduced into the Pacific Northwest, and the industry has grown rapidly ever since. In 1936 about 86,000,000 pounds of fruit were frozen.

On the other hand, the freezing of vegetables is of recent origin. The invention by Birdseye and others of quick freezing systems which permit the freezing of packaged products and the discovery that the inactivation of the enzymes of vegetables by blanching prior to freezing is essential in order to prevent the development of off flavors, were necessary before satisfactory processes could be developed. Small quantities were frozen as a commercial experiment in 1929 but the first operations of importance were carried out by the Frosted Foods Sales Corporation in 1930. In 1935 approximately 16,000,000 pounds of frozen vegetables were packed in the United States. The quantity packed during the past season was approximately double this figure, and even then the demand exceeded the supply.

Not all kinds of fruits and vegetables yield satisfactory frozen products, but the number of excellent products is much greater than most persons realize. The Western Canner and Packer lists eighteen fruits frozen commercially in the Pacific Northwest. To this list can be added cranberries and blueberries frozen in New England, pineapples frozen in Porto Rico, and figs and orange juice frozen in California.

The list of vegetables frozen commercially is nearly as long, including asparagus, lima beans, snap beans, broccoli, carrots, cauliflower, sweet corn, both on the cob and whole grain, mushrooms, peas, rhubarb, spinach, and squash. Many others yield desirable frozen products, e. g. artichokes, Swiss chard, kale, and many other greens, new potatoes, and beets. At present nearly half the total production consists of peas, but as the excellence of the other kinds of vegetables becomes known their use will become more extensive.

In New York State the principal products frozen are cherries, peas, snap beans, and sweet corn, altho small quantities of strawberries, raspberries, apples, spinach, carrots, and broccoli were frozen last year.

Marketing Frozen Fruits and Vegetables

THE distribution and retailing of frozen fruits and vegetables is much more difficult than that of frozen meats, poultry, and fish, because frozen fruits and vegetables do not keep long after thawing. Thawed meats, fish, and poultry can scarcely be told from similar products which have not been frozen. On the other hand, thawed fruits and vegetables are very different in appearance and keeping qualities from fresh fruits and vegetables. For these reasons, it is essential that frozen fruits and vegetables be delivered to the consumer in the solidly frozen condition and that he either keep them at low temperatures or consume them promptly.

There are two distinct outlets for frozen fruits and vegetables, first, hotels, restaurants, cafeterias, institutions, railway dining cars, and steamship lines, and second, retailers who sell direct to housewives. The first-mentioned market is available to all, but the latter is outside the reach of the ordinary packer, since very few retailers have the proper refrigeration facilities required for the storage and display of frozen foods. In order to get the average retailer to install equipment suitable for holding foods

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PAPER CONTAINERS

(Continued from page 7)

Farm and Home Week at Ithaca in February suggested the desirability of doing away entirely with house to house delivery of milk in glass bottles in these areas.

This rapid increase in the use of single-service containers has raised questions regarding their sanitary condition, especially where they are used for perishable and easily contaminated liquids such as milk. The desirability of single-service containers is evident to everyone, provided they are practical and are really sterile. Rinse tests of paper containers show that they are not perfectly sterile, and questions arise, Are the bacteria present derived from dust in the air, from the paraffine, from the adhesives used, or from the paper itself? Is there any chance that human disease germs might be present? What standards of sterility are fair and reasonable?

These and other questions caused the New York City and New York State Departments of Health to request a study of the matter. Facilities for such studies have been provided at the Station thru the cooperation of makers of paper containers. Work has just been started and will be continued for at least a year.

WHY DO FAT TESTS VARY? A PERPETUAL QUERY

Fat Adhering To Cans Does Not Affect Test Materially If Milk Is Thoroly Stirred—Temperature Of Storage Also Has Little Influence On Results

by J. C. MARQUARDT and H. L. DURHAM

IN the two previous articles we have shown that the fat content of milk varies as secreted by the cow, that slight variations in test may be due to testing procedures, and that milk at the one milk plant studied was well mixed by pouring into the weigh can. In this article we hope to show that the accuracy of the samples for fat tests were not affected by the storage temperature of the milk, but storage of milk for even 1 hour permitted a marked rising of the fat globules which carried many bacteria with them into the cream layer.

In the series of tests made to demonstrate the influence of storage temperature upon the fat content of the sample of milk taken by the regular procedure, an endeavor was made to use milk with a high fat content. The milk after dumping was also returned to the original cans and stirred vigorously. The object of this procedure was to demonstrate whether or not the patron's test was decreased due to fat adhering to the can. The findings are summarized in Table 1.

It is necessary to explain that the milk was placed in the cans and air cooled to 55°F for 18 hours. This procedure was followed as preliminary work had demonstrated that this treatment was ideal for forming fat deposits on the side of the cans. The 18 comparisons were sufficient to establish the points in question. These results show that milk thoroly mixed and sampled will test the same after it has been stored for 18 hours at 55°F and poured but once, according to the regular procedure. The results show further that the small amount of fat remaining in the cans is not sufficient to decrease the test of the milk. The contention that tests are decreased because of fat adhering to the can after dumping is false, according to these findings. It was demonstrated that stirring after pouring from the can had no significant influence upon the sample taken for the test.

In another series, 12 lots of milk were tested when fresh and after being stored at 40° and 70°F for 18 hours. Samples were taken directly from the cans after the storage period. The milk was stirred before these samples were taken, then dumped and a sample taken. The milk was again dumped and another sample taken. The results summarized in Table 2 show that milk can be properly sampled from a can after vigorous stirring. It shows further that stirring before dumping has no advantage.

In all series considered, the variations in tests obtained from samples taken according to varying procedures were within the range of accuracy credited to the Babcock test.

In a previous study the change in the composition and bacterial content of the top and mixed milk was noted when the milk was stored in cans set in ice water for cooling. These findings are again presented in Table 3. They indicate further the desirability of mixing milk completely before sampling for fat and bacterial analyses, even tho the milk has stood undisturbed for only a brief time. This is exceedingly important when the samples are used first for bacterial counts and then for fat analysis. Sampling to secure accurate bacterial tests only was not undertaken.

Summary Of Studies

THE comparisons made under the conditions of this study demonstrated that dumping milk and sampling at once resulted in a fair sample. Stirring the milk before or after dumping did not improve the uniformity of samples, but it is not safe to assume stirring is unnecessary. Experiments should be made to determine this point at each milk plant.

The results indicated that a proper sample could be obtained from milk in cans only after complete stirring.

Cream adhering to the sides of the cans is not a factor in altering the composition of the sample when it is taken from the milk weigh can.

The results of this study hold only for the conditions under which they were obtained, but when milk is sampled after dumping in a weigh can at a milk plant the uniformity of fat distribution can be checked by following the regular procedure, and then by obtaining another sample after vigorous stirring.

The findings of this study indicate that from 20 to 200 comparisons are sufficient to establish the accuracy of the routine method of sampling. Each installation must be checked to establish its correctness for properly sampling milk for fat analysis because such factors as the shape of the weigh can, type of strainer, and the like, vary from plant to plant.

(This is the third and last of a series of articles on variations in fat tests.)

TABLE 1.—INFLUENCE OF STORAGE UPON TEST OF MILK SAMPLED BY REGULAR PROCEDURE AND THE INFLUENCE OF FAT ADHERING TO THE CANS UPON THE TEST.

No. of trials	Fresh milk	After 18 hours storage at 55° F		
		Regular sample	Well mixed	Returned to can and well mixed
18	5.6	5.6	5.5	5.6

TABLE 2.—INFLUENCE OF SAMPLING FROM CAN, STIRRING BEFORE DUMPING, AND REPEATED POURING UPON PERCENTAGE OF FAT IN SAMPLES TAKEN FOR TESTING.

Fresh milk	Storage		Treatment of milk		
	Time, hours	Temperature, ° F	Can stirred	Can stirred and dumped	Can stirred and dumped twice
5.4	18	40	5.3	5.4	5.4
5.4	18	70	5.4	5.4	5.4

TABLE 3.—THE BACTERIAL AND FAT CONTENT OF MILK ABOUT 1 INCH FROM THE TOP OF THE CAN DURING COOLING IN WATER AT 40°F WITHOUT AGITATION.*

Kind and age of milk	Bacteria per cc at initial temperatures of		Percentage fat at initial temperatures of	
	98°F	50°F	98°F	50°F
Fresh milk, mixed	53,000	53,000	5.0	5.0
Top milk, 1 hour old	133,000	108,000	14.7	7.7
Top milk, 2 hours old	195,000	167,000	17.9	15.3
Top milk, 5 hours old	282,000	262,000	19.8	16.4
Mixed milk, 6 hours old	52,000	53,000	5.0	5.0

*The averages are based on five lots of milk secured immediately after milking.

NEW PRODUCTS

(Continued from page 14)

in the frozen condition, it is necessary to be able to offer him other frozen foods in addition to vegetables. At present only one packer who has a number of plants in various sections of the country is able to do this.

However, the wholesale trade to hotels, restaurants, and institutions is much larger than the retail business. Moreover, frozen vegetables are becoming more and more popular with hotels and restaurants. The principal reasons for this popularity are the following:

1. When cooked, it is difficult to distinguish between frozen and fresh vegetables.
2. The frozen vegetables are ordinarily more uniform in quality than the fresh vegetables obtainable in city markets.
3. Like canned vegetables, they are prepared for the table, and require but little storage space.
4. They resemble canned vegetables in requiring almost no cooking.
5. It is a simple matter to calculate the exact cost of a single portion. Further, this cost does not vary greatly from day to day.

Use Of Frozen Fruits and Vegetables

THE use of frozen fruits in the home is not yet common. Frozen strawberries and raspberries are used to some extent by housewives, but as ordinarily packed (two parts of berries to one of sugar), they are so sweet that they are not relished for dessert purposes. The introduction of sliced strawberries, packed 4+1 or even 5+1, has done a great deal to popularize frozen strawberries for use as a dessert. Crushed raspberries with sugar, packed 4+1, should also become very popular. Another product that some day will be commonly eaten as a dessert is sliced peaches packed in a heavy syrup. Great care must be taken in order to obtain a high class product; when this is done, a delicious dessert is obtained.

As yet the principal users of frozen fruits are the jam, jelly, and preserve makers, the bakers, and the ice cream manufacturers. The jam, jelly, and preserve makers use frozen fruits because they enable them to operate all the year around. The bakers use frozen fruit because it gives them a product slightly superior to that obtained by the use of canned fruit.

Frozen vegetables are becoming very popular largely because of their bright colors and fresh flavors. As has been pointed out, they possess many of the advantages of canned vegetables and yet most of the qualities of fresh vegetables. The main difficulties encountered are the necessity of keeping the products frozen until they are cooked and the rapid loss of color and flavor occurring when they are held on a steam table. The former is becoming less of a problem since electric refrigerators with low temperature compartments (commonly used for ice making) are more common. Since most frozen vegetables need no preparation for the table except for a very short period of cooking, many restaurants do not hold them on a steam table but cook the individual orders when received.

On the average the time required for cooking is approximately half that of fresh vegetables. Peas are the most popular vegetables, but lima beans, broccoli, asparagus, snap beans, and sweet corn are rapidly increasing in popularity.

The Future Of Frozen Foods

THE continued expansion of the frozen food industry for many years to come is anticipated. As more and more retail stores are equipped with low temperature display cabinets, the sales will rapidly increase. At present the retail distribution of frozen foods is confined largely to New England, New York, New Jersey, Pennsylvania, and Maryland. Thus two-thirds of the American housewives cannot buy frozen fruits and vegetables even tho they desire them.

Once the retail trade in frozen fruits and vegetables is established thruout the large cities in the country so that national advertising will be profitable, it will grow very rapidly; as it will then be possible for the larger producers to break down the general prejudice against frozen foods.

Even the wholesale business is relatively limited because of the lack of wholesale distributors. There are relatively few cold storages fitted for holding frozen fruits and vegetables at 0° F or lower in the southern states, and still fewer distributors of frozen foods. The Tennessee Valley Authority is encouraging the construction of suitable cold storages and is also trying to start the production of frozen fruits and vegetables in that region, realizing that such moves will increase the consumption of power.

When the distribution of frozen foods becomes more general, the food habits of this and other countries will change rapidly. The people of small towns where ocean fish are not now available will begin eating frozen seafoods. An important industry engaged in the freezing of tropical fruits and vegetables will spring up. Frozen mangoes, avocadoes, dates, persimmons, papayas, and many other tropical and semi-tropical fruits which cannot now be kept long in the fresh state, will be sold in steadily increasing quantities as the people of the temperate zones get to know them. These frozen tropical fruits will also be utilized for the making of fruit ice cream and ice cream sauces.

On the other hand, the vegetables grown only in cool climates, such as broccoli, cauliflower, peas, spinach, etc., will be frozen and marketed in increasingly larger quantities to the peoples of the semi-tropical and tropical regions.

As the demand for frozen fruits and vegetables grows, processes of freezing many other vegetables and fruits will be worked out. Frozen nectarines, plums, beets, new potatoes, sauerkraut, brussels sprouts, and many other frozen fruits and vegetables not now offered will be added to the list of products. In addition, mixed vegetables such as succotash will be offered.

(This is the first of a series of articles by Dr. Tressler on this subject taken from an address before the 105th annual meeting of the New York State Agricultural Society in Albany, January 26, 1937.)

THESE ARE NEW

Bul. No. 678. Recent Investigations on the Control of Cedar-apple Rust in the Hudson Valley.—J. M. Hamilton.

The life history of the cedar-apple rust as it occurs in apple orchards in the Hudson Valley is described and experiments with a number of spray materials aimed at the control of the disease are reported. The cedar rust disease on apples is generally held in check satisfactorily in those orchards where apple scab is being efficiently controlled. The only alternative to an efficient spray program is the introduction of resistant varieties, since it is impracticable to attempt to combat the stage in the life history of the fungus that is spent on the cedar. Varieties that have displayed a high degree of resistance to cedar rust include Milton, McIntosh, and Cortland.

Circ. No. 153. Raspberry Growing in New York.—G. L. Slate, L. M. Cooley, and F. L. Gambrell.

While this is a revision of an earlier publication bearing the same number and title, it contains much new material on varieties, diseases, and insect pests of raspberries.

If you would like to receive these publications, simply address a post card to the Experiment Station at Geneva, giving the number of the pamphlet you want. Be sure to sign your name and give your post office. The publication requested will be sent to you at once without charge.